Progress in the Simulation of the Energy Resolution Function for CSNS Back-n Facility

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The Back-n facility at the China Spallation Neutron Source (CSNS) is a newly-built white neutron beam based on the time-of-flight technique. The Energy resolution function (ERF) is essential for the data analysis, particularly in the neutron resonance energy region. The ERF represents the inherent broadening effect for the measured resonance peaks, primarily caused by the process of the neutron production and moderation in the spallation target, which cannot be directly acquired with experimental method. The Geant4 Monte-Carlo toolkit can be used for investigating the ERF distribution of Back-n facility, as its flexible capabilities of particle tracking and information recording. The spallation target model has been built, the moderation distance (ΔL) is defined as the product of the velocity and moderation time of neutrons in the target. The back-streaming neutrons' parameters at the spallation target surface are recorded, the distributions of ΔL at different energies are obtained. Furthermore, the neutrons that can reach experimental stations are selected by reconstruction method, and the very low statistics require a novel technique to enhance the weight of the neutrons that we are interested in.